

The Effects of the Communication Ear Plug on Crew Coordination

Currently, Army Aviation faces a number of challenges with balancing the need for equipment with limited resources. One particular problem of note exists in aviation cockpits. Several aircrew members, especially in the UH-60 community, are unable to hear members of their crew, due to the use of the Communication Ear Plug (CEP). It appears that when one or more of the aircrew members, but not all, wears the CEP during flight, it is difficult for those who are not equipped with the CEP to hear his or her fellow aircrew members. Therefore, the partial fielding of the CEP significantly degrades aircrew coordination and the overall effectiveness of the U.S. Army Aircrew.

The CEP is designed to enhance hearing attenuation while providing increased hearing protection for Army Aviators. To prevent hearing loss and improve hearing conservation, most aircrew members wear additional hearing protection in the form of foam or flanged fitted earplugs. While this solves the problem of eliminating most harmful ambient noise levels, it creates the additional problem of degrading speech interpretation. The CEP was developed by the U.S. Army Aeromedical Research Laboratory (USAARL) as a low cost, highly effective method of additional hearing protection, while enhancing voice communications and speech intelligibility.

Several aviation units are currently issuing the CEP to aircrew members, and in some cases issuing the HGU-56 /P with the CEP already installed. However, not all aircrew members in Army aviation, both Active and Reserve have been fielded with this valuable piece of equipment. In fact, several aircrew members purchase the CEP locally with personal funds.

The Army purchased 7,400 CEP sets to be fielded in early 2002. This is good news. However, it appears that not all aircrew members will get the CEP in a timely manner, especially in National Guard and Reserve units. Because of this, it is important that the Army and its commanders recognize and address the negative effects of not having all aircrew members equipped with the CEP and most importantly, how that potential decrease in crew coordination effectiveness can impact the safety of the aircrew.

A significant number of Army Aviation accidents are a result of crew coordination errors. Most crew coordination errors are avoided through crew-level training. However, some crew coordination errors are due to a series of errors resulting from either equipment failure, adverse environmental effects or misinterpretation by one or more crewmembers. Communicate positively is the first and most important element in successful crew coordination. Without positive, concise communications between aircrew members, all elements of crew coordination are significantly degraded, and can place the aircrew in jeopardy.

If aircrew members are unable to clearly hear their fellow crewmembers, or external radio transmissions, the ability to communicate positively is severely reduced. Aircrew members have to fix, adjust or adapt to the problem at their level. This creates increased pilot or crewmember workload throughout the mission.

The problem can be separated into two categories. One is the effect the CEP has on the ability to hear radio transmissions. The second is the effect the CEP has on the ability to hear fellow crewmembers. For example, in the UH-60 airframe, the first problem usually exists when one of the crewmembers is wearing the CEP and the rest of the crew is not. Because of the effectiveness of the CEP transducer, the person wearing the CEP can hear the FM, UHF, and VHF radios well and tends to turn down the volume on the radio control head. This reduced volume causes the other crewmembers to have difficulty hearing radio transmissions being sent to the aircraft. They can react to this problem in a number of ways. The crewmembers without the CEP can turn their Internal Communications System (ICS) volume down, take out additional hearing protection, ask another crewmember to repeat the radio transmission, or do nothing at all and inevitably lose situational awareness. All of these actions severely interfere with positive crew cockpit communications and crew coordination, which increases pilot/crewmember workload.

The second problem occurs when the crewmember wearing the CEP speaks. Studies have shown that there is an effect of wearing hearing protection on both the listener and the speaker. Assume that crewmembers not wearing the CEP are forced to turn their individual ICS box volume up, or remove, either partially or fully, their earplugs in order to hear the external radio transmissions. Because the external radios are now louder to the non-CEP equipped crewmember, they are exposed to significantly great ambient noise, which equates to nearly the same decibel (dB) level as not wearing any hearing protection at all. Interestingly, in a noisy or heavy task loaded environment, individuals wearing hearing protection tend to speak 2 to 4 dB more softly and 25 percent faster. Therefore, the inability to hear the person with the CEP is doubled. This creates a nearly insurmountable environment for crewmembers without the CEP to try to hear their softer speaking fellow crewmember over louder radios or additional external noise.

Due to limited resources, the Army is currently unable to provide CEPs to 100% of its aircrew members. The Army may eventually be able to provide Aviation units with this highly effective piece of equipment, but until then, unit commanders are faced with a tough decision: "Do they allow aircrews with mixed hearing protection capabilities to fly with one another, risking degraded crew coordination, increasing aircrew workload, and inherently increasing the overall risk of the flight? Or do they restrict the use of CEPs until all members of the aircrew possess this piece of equipment?"

When it comes to providing resources to today's Army, a lot of analysis must occur and tough decisions are made. The fact is that those decisions almost always directly affect the individual soldier, or in this particular case the aircrew member. Increased technology, contrasted against a lack of resources causes the soldier to react to, rather than gain benefit from a piece of equipment that was designed to improve communications. Because of this, Army leaders must either train the soldier, or establish restrictions in order to protect the soldier from harm. Today's Army aviators and aircrew members must identify that there is a potential risk with using the CEP with less than fully equipped aircrews. Today's Army Aviation leaders must be able to recognize this CEP issue, and consequently establish control measures that will reduce the risk to the aircrew. It would be extremely unfortunate if an accident occurred because we failed to properly outfit our personnel.

